

OSWER VAPOR INTRUSION ASSESSMENT

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 2.0, May 2012 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration	Calculated Indoor Air Concentration	VI Carcinogenic Risk	VI Hazard
		Csg (ug/m ³)	Cia (ug/m ³)	CR	HQ
83-32-9	Acenaphthene		--	--	--
75-07-0	Acetaldehyde		--	--	--
67-64-1	Acetone		--	--	--
75-86-5	Acetone Cyanohydrin		--	--	--
75-05-8	Acetonitrile		--	--	--
98-86-2	Acetophenone		--	--	--
107-02-8	Acrolein		--	--	--
107-13-1	Acrylonitrile		--	--	--
107-05-1	Allyl Chloride		--	--	--
120-12-7	Anthracene		--	--	--
11104-28-2	Aroclor 1221		--	--	--
11141-16-5	Aroclor 1232		--	--	--
103-33-3	Azobenzene		--	--	--
100-52-7	Benzaldehyde		--	--	--
x 71-43-2	Benzene		--	--	--
108-98-5	Benzenethiol		--	--	--
98-07-7	Benzotrichloride		--	--	--
100-44-7	Benzyl Chloride		--	--	--
92-52-4	Biphenyl, 1,1'-		--	--	--
108-60-1	Bis(2-chloro-1-methylethyl) ether		--	--	--
111-44-4	Bis(2-chloroethyl)ether		--	--	--
542-88-1	Bis(chloromethyl)ether		--	--	--
107-04-0	Bromo-2-chloroethane, 1-		--	--	--
108-86-1	Bromobenzene		--	--	--
74-97-5	Bromochloromethane		--	--	--
75-27-4	Bromodichloromethane		--	--	--
74-83-9	Bromomethane		--	--	--
x 106-99-0	Butadiene, 1,3-		--	--	--
x 104-51-8	Butylbenzene, n-		--	--	--
75-15-0	Carbon Disulfide		--	--	--
56-23-5	Carbon Tetrachloride		--	--	--
75-68-3	Chloro-1,1-difluoroethane, 1-		--	--	--
126-99-8	Chloro-1,3-butadiene, 2-		--	--	--
107-20-0	Chloroacetaldehyde, 2-		--	--	--
108-90-7	Chlorobenzene		--	--	--
98-56-6	Chlorobenzotrifluoride, 4-		--	--	--
109-69-3	Chlorobutane, 1-		--	--	--
75-45-6	Chlorodifluoromethane		--	--	--
x 67-66-3	Chloroform		--	--	--
74-87-3	Chloromethane		--	--	--
107-30-2	Chloromethyl Methyl Ether		--	--	--
91-58-7	Chloronaphthalene, Beta-		--	--	--
95-57-8	Chlorophenol, 2-		--	--	--
76-06-2	Chloropicrin		--	--	--
95-49-8	Chlorotoluene, o-		--	--	--
106-43-4	Chlorotoluene, p-		--	--	--
123-73-9	Crotonaldehyde, trans-		--	--	--
98-82-8	Cumene		--	--	--
57-12-5	Cyanide (CN-)		--	--	--
460-19-5	Cyanogen		--	--	--

Inhalation Unit Risk	IUR Source*	Reference Concentration	RFC Source*	Mutagenic Indicator
		RFC (mg/m ³)		
IUR (ug/m ³) ⁻¹		i		
2.20E-06	I	9.00E-03	I	
		3.10E+01	A	
		6.00E-02	P	
		6.00E-02	I	
		2.00E-05	I	
6.80E-05	I	2.00E-03	I	
6.00E-06	CA	1.00E-03	I	
5.70E-04	S			
5.70E-04	S			
3.10E-05	I			
7.80E-06	I	3.00E-02	I	
4.90E-05	CA	1.00E-03	P	
		4.00E-04	X	
1.00E-05	H			
3.30E-04	I			
6.20E-02	I			
6.00E-04	X			
		6.00E-02	I	
		4.00E-02	X	
3.70E-05	CA			
		5.00E-03	I	
3.00E-05	I	2.00E-03	I	
		7.00E-01	I	
6.00E-06	I	1.00E-01	I	
		5.00E+01	I	
3.00E-04	I	2.00E-02	I	
		5.00E-02	P	
		3.00E-01	P	
		5.00E+01	I	
2.30E-05	I	9.80E-02	A	
		9.00E-02	I	
6.90E-04	CA			
		4.00E-04	CA	
		4.00E-01	I	
		4.00E-01	I	

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		Csg (ug/m ³)	Cia (ug/m ³)	CR	HQ
506-68-3	Cyanogen Bromide		--	--	--
506-77-4	Cyanogen Chloride		--	--	--
110-82-7	Cyclohexane		--	--	--
132-64-9	Dibenzofuran		--	--	--
96-12-8	Dibromo-3-chloropropane, 1,2-		--	--	--
124-48-1	Dibromochloromethane		--	--	--
106-93-4	Dibromoethane, 1,2-		--	--	--
74-95-3	Dibromomethane (Methylene Bromide)		--	--	--
764-41-0	Dichloro-2-butene, 1,4-		--	--	--
1476-11-5	Dichloro-2-butene, cis-1,4-		--	--	--
110-57-6	Dichloro-2-butene, trans-1,4-		--	--	--
95-50-1	Dichlorobenzene, 1,2-		--	--	--
x 106-46-7	Dichlorobenzene, 1,4-		--	--	--
x 75-71-8	Dichlorodifluoromethane		--	--	--
x 75-34-3	Dichloroethane, 1,1-		--	--	--
x 107-06-2	Dichloroethane, 1,2-		--	--	--
x 75-35-4	Dichloroethylene, 1,1-		--	--	--
x 540-59-0	Dichloroethylene, 1,2- (Mixed Isomers)		--	--	--
156-59-2	Dichloroethylene, 1,2-cis-		--	--	--
156-60-5	Dichloroethylene, 1,2-trans-		--	--	--
78-87-5	Dichloropropane, 1,2-		--	--	--
142-28-9	Dichloroproppane, 1,3-		--	--	--
542-75-6	Dichloropropene, 1,3-		--	--	--
77-73-6	Dicyclopentadiene		--	--	--
75-37-6	Difluoroethane, 1,1-		--	--	--
94-58-6	Dihydrosafrole		--	--	--
108-20-3	Diisopropyl Ether		--	--	--
1445-75-6	Diisopropyl Methylphosphonate		--	--	--
121-69-7	Dimethylaniline, N,N-		--	--	--
120-61-6	Dimethylterephthalate		--	--	--
513-37-1	Dimethylvinylchloride		--	--	--
505-29-3	Dithiane, 1,4-		--	--	--
106-89-8	Epichlorohydrin		--	--	--
106-88-7	Epoxybutane, 1,2-		--	--	--
759-94-4	EPTC		--	--	--
x 141-78-6	Ethyl Acetate		--	--	--
140-88-5	Ethyl Acrylate		--	--	--
75-00-3	Ethyl Chloride		--	--	--
60-29-7	Ethyl Ether		--	--	--
97-63-2	Ethyl Methacrylate		--	--	--
100-41-4	Ethylbenzene		--	--	--
75-21-8	Ethylene Oxide		--	--	--
151-56-4	Ethylenimine		--	--	--
86-73-7	Fluorene		--	--	--
110-00-9	Furan		--	--	--
822-06-0	Hexamethylene Diisocyanate, 1,6-		--	--	--
110-54-3	Hexane, N-		--	--	--
591-78-6	Hexanone, 2-		--	--	--
74-90-8	Hydrogen Cyanide		--	--	--
NA (JP-7)	JP-7		--	--	--

Inhalation Unit Risk	IUR Source*	Reference Concentration	RFC Source*	Mutagenic Indicator
				i
IUR (ug/m ³) ⁻¹		6.00E+00	I	
6.00E-03	P	2.00E-04	I	Mut
2.70E-05	CA	9.00E-03	I	
6.00E-04	I	4.00E-03	X	
4.20E-03	P			
4.20E-03	P			
4.20E-03	P			
		2.00E-01	H	
1.10E-05	CA	8.00E-01	I	
		1.00E-01	X	
1.60E-06	CA			
2.60E-05	I	7.00E-03	P	
		2.00E-01	I	
6.00E-02	P			
1.00E-05	CA	4.00E-03	I	
		6.00E-02	P	
4.00E-06	I	2.00E-02	I	
		7.00E-03	P	
		4.00E+01	I	
		7.00E-01	P	
1.20E-06	I	1.00E-03	I	
		2.00E-02	I	
		1.00E+01	I	
		3.00E-01	P	
2.50E-06	CA	1.00E+00	I	
8.80E-05	CA	3.00E-02	CA	
		1.00E-05	I	
		7.00E-01	I	
		3.00E-02	I	
		8.00E-04	I	
		3.00E-01	A	

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CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration	Calculated Indoor Air Concentration	VI Carcinogenic Risk	VI Hazard
		Csg (ug/m ³)	Cia (ug/m ³)	CR	HQ
7439-97-6	Mercury (elemental)		--	--	--
126-98-7	Methacrylonitrile		--	--	--
79-20-9	Methyl Acetate		--	--	--
96-33-3	Methyl Acrylate		--	--	--
78-93-3	Methyl Ethyl Ketone (2-Butanone)		--	--	--
108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--
624-83-9	Methyl Isocyanate		--	--	--
80-62-6	Methyl Methacrylate		--	--	--
25013-15-4	Methyl Styrene (Mixed Isomers)		--	--	--
1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--
75-09-2	Methylene Chloride		--	--	--
90-12-0	Methylnaphthalene, 1-		--	--	--
91-57-6	Methylnaphthalene, 2-		--	--	--
98-83-9	Methylstyrene, Alpha-		--	--	--
8012-95-1	Mineral oils		--	--	--
64724-95-6	Naphtha, High Flash Aromatic (HFAN)		--	--	--
91-20-3	Naphthalene		--	--	--
98-95-3	Nitrobenzene		--	--	--
75-52-5	Nitromethane		--	--	--
79-46-9	Nitropropane, 2-		--	--	--
924-16-3	Nitroso-di-N-butylamine, N-		--	--	--
88-72-2	Nitrotoluene, o-		--	--	--
111-84-2	Nonane, n-		--	--	--
109-66-0	Pentane, n-		--	--	--
75-44-5	Phosgene		--	--	--
123-38-6	Propionaldehyde		--	--	--
103-65-1	Propyl benzene		--	--	--
115-07-1	Propylene		--	--	--
75-56-9	Propylene Oxide		--	--	--
129-00-0	Pyrene		--	--	--
110-86-1	Pyridine		--	--	--
100-42-5	Styrene		--	--	--
630-20-6	Tetrachloroethane, 1,1,1,2-		--	--	--
x 79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--
x 127-18-4	Tetrachloroethylene		--	--	--
811-97-2	Tetrafluoroethane, 1,1,1,2-		--	--	--
109-99-9	Tetrahydrofuran		--	--	--
463-56-9	Thiocyanate		--	--	--
x 108-88-3	Toluene		--	--	--
76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-		--	--	--
87-61-6	Trichlorobenzene, 1,2,3-		--	--	--
120-82-1	Trichlorobenzene, 1,2,4-		--	--	--
x 71-55-6	Trichloroethane, 1,1,1-		--	--	--
x 79-00-5	Trichloroethane, 1,1,2-		--	--	--
x 79-01-6	Trichloroethylene	2.9E+01	2.90E+00	9.7E-07	3.3E-01
75-69-4	Trichlorofluoromethane		--	--	--
598-77-6	Trichloropropane, 1,1,2-		--	--	--
96-18-4	Trichloropropene, 1,2,3-		--	--	--
96-19-5	Trichloropropene, 1,2,3-		--	--	--
121-44-8	Triethylamine		--	--	--

Inhalation Unit Risk	IUR Source*	Reference Concentration	RFC Source*	Mutagenic Indicator
		RFC (mg/m ³)		
IUR (ug/m ³) ⁻¹				i
		3.00E-04	I	
		7.00E-04	H	
		5.00E+00	I	
		3.00E+00	I	
		7.00E-01	I	
		4.00E-02	H	
	2.60E-07	CA	3.00E+00	I
	1.00E-08	I	6.00E-01	I Mut
		1.00E-01	P	
	3.40E-05	CA	3.00E-03	I
	4.00E-05	I	9.00E-03	I
	9.00E-06	P	2.00E-02	P
	2.70E-03	H	2.00E-02	I
	1.60E-03	I		
		2.00E-01	P	
		1.00E+00	P	
		3.00E-04	I	
		8.00E-03	I	
		1.00E+00	X	
	3.70E-06	I	3.00E-02	I
		1.00E+00	I	
	7.40E-06	I		
	5.80E-05	CA		
	2.60E-07	I	4.00E-02	I
		8.00E+01	I	
		5.00E+00	I	
		3.00E+01	H	
		2.00E-03	P	
		5.00E+00	I	
	1.60E-05	I	2.00E-04	X
see note	I	2.00E-03	I	TCE
		7.00E-01	H	
		3.00E-04	I	Mut
		3.00E-04	P	
		7.00E-03	I	

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Target Hazard Quotient for Non-Carcinogens	THQ SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration	Calculated Indoor Air Concentration	VI Carcinogenic Risk	VI Hazard
		Csg (ug/m ³)	Cia (ug/m ³)	CR	HQ
526-73-8	Trimethylbenzene, 1,2,3-	--	--	--	--
95-63-6	Trimethylbenzene, 1,2,4-	--	--	--	--
108-67-8	Trimethylbenzene, 1,3,5-	--	--	--	--
108-05-4	Vinyl Acetate	--	--	--	--
593-60-2	Vinyl Bromide	--	--	--	--
x 75-01-4	Vinyl Chloride	--	--	--	--
x 108-38-3	Xylene, m-	--	--	--	--
x 95-47-6	Xylene, o-	--	--	--	--
x 106-42-3	Xylene, P-	--	--	--	--
x 1330-20-7	Xylenes	--	--	--	--

Inhalation Unit Risk	IUR Source*	Reference Concentration	RFC Source*	Mutagenic Indicator
IUR (ug/m ³) ⁻¹		(mg/m ³)		i
		5.00E-03	P	
		7.00E-03	P	
		2.00E-01	I	
3.20E-05	H	3.00E-03	I	
4.40E-06	I	1.00E-01	I	VC
		1.00E-01	S	
		1.00E-01	S	
		1.00E-01	S	
		1.00E-01	I	

Notes:

(1)	Inhalation Pathway Exposure Parameters (RME):	Units	Residential	Commercial	Selected (based on scenario)
	Exposure Scenario				
	Averaging time for carcinogens	(yrs)	Symbol ATc_R_SG 70	Symbol ATc_C_SG 70	Symbol ATc_SG 70
	Averaging time for non-carcinogens	(yrs)	Symbol ATnc_R_SG 30	Symbol ATnc_C_SG 25	Symbol ATnc_SG 25
	Exposure duration	(yrs)	Symbol ED_R_SG 30	Symbol ED_C_SG 25	Symbol ED_SG 25
	Exposure frequency	(days/yr)	Symbol EF_R_SG 350	Symbol EF_C_SG 250	Symbol EF_SG 250
	Exposure time	(hr/day)	Symbol ET_R_SG 24	Symbol ET_C_SG 8	Symbol ET_SG 8

(2)	Generic Attenuation Factors:	Residential	Commercial	Selected (based on scenario)	
	Source Medium of Vapors				
	Groundwater	(-)	Symbol AFgw_R_SG 0.001	Symbol AFgw_C_SG 0.001	Symbol AFgw_SG 70
	Sub-Slab and Exterior Soil Gas	(-)	Symbol AFss_R_SG 0.1	Symbol AFss_C_SG 0.1	Symbol AFss_SG 0.1

(3)	Formulas	Residential	Commercial	Selected (based on scenario)
	Cia, target = MIN(Cia,c; Cia,nc)			
	Cia,c (ug/m ³) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)			
	Cia,nc (ug/m ³) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RFC x (1000 ug/mg) / (ED x EF x ET)			
(4)	Special Case Chemicals	Residential	Commercial	Selected (based on scenario)
	Trichloroethylene	Symbol mIURTCE_R_SG 1.00E-06	Symbol nIURTCE_C_SG 0.00E+00	Symbol mIURTCE_SG 0.00E+00
		Symbol IURTCE_R_SG 3.10E-06	Symbol IURTCE_C_SG 4.10E-06	Symbol IURTCE_SG 4.10E-06

Mutagenic Chemicals The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.	Age Cohort	Exposure Duration	Age-dependent adjustment factor
	0 - 2 years	2	10
	2 - 6 years	4	3
	6 - 16 years	10	3
	16 - 30 years	14	1

Mutagenic-mode-of-action (MMOA) adjustment factor: 25 This factor is used in the equations for mutagenic chemicals.

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		Csg	Cia	CR	HQ			RFC				
		(ug/m ³)	(ug/m ³)					(ug/m ³) ⁻¹				

x Vinyl Chloride See the Navigation Guide equation for Cia,c for vinyl chloride.

x

Notation:

x I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: <http://www.epa.gov/iris/subst/index.html>

x P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: <http://happrtv.ornl.gov/pprtv.shtml>

x A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: <http://www.atsdr.cdc.gov/mrls/index.html>

x CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: <http://www.oehha.ca.gov/risk/ChemicalDB/index.asp>

x H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: <http://epa-heast.ornl.gov/heast.shtml>

x S = See RSL User Guide, Section 5

x X = PPRTV Appendix

x Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).

x VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).

x TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).

x Yellow highlighting indicates site-specific parameters that may be edited by the user.

x Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.

x Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).